Relative age effect and soccer refereeing: A ‘Strategic Adaptation’ of relatively younger children?

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Abstract

Previous research suggested that the relative age effect (RAE) has a psychological influence on children and their decision to engage in a particular sport. Relatively younger children seem to have lower self-esteem. Indeed, because of the disadvantages of being younger, it is assumed that these players experience more situations of failure and inferiority. Because of these negative performance cues, it is likely that these young players feel less competent, which eventually leads to a higher dropout rate. These children can also decide to participate in sports in which physical attributes are less important. This shift from one sport to another can be interpreted as a ‘strategic adaptation’. The purpose of this study was thus to investigate whether refereeing could be another form of ‘strategic adaptation’. If a child chooses a specific sport but then does not feel competent enough to be a player, refereeing might be an alternate path followed to stay in the environment of a sport they like. Given the minimal age limits for refereeing, two hypotheses were formulated: (1) ‘reversed’ RAE would be observed in district referees younger than 18 years old and (2) no RAE would be observed in district referees older than 18 years old, regional referees and national referees. The birthdates of all official male soccer referees (n = 13,952) were collected from the federation database. Results show that the distribution of all district referees was significantly unbalanced ($\chi^2 = 18.73$, df = 3, $P < 0.001$) with an over-representation of individuals who were born in the second half of the competitive year. As expected, this imbalance was exclusively located in district referees of 18 years old and less ($\chi^2 = 8.03$, df = 3, $P < 0.05$), while the distribution was uniform for adults ($\chi^2 = 5.17$, df = 3, $P < 0.16$). Concerning regional referees ($\chi^2 = 2.09$, df = 3, $P < 0.554$) and national referees ($\chi^2 = 3.75$, df = 3, $P < 0.290$), the results also provide support for our initial hypothesis as uniform distributions were found for both groups. This study brings to light new elements in the potential relationship between relative age and refereeing. Qualitative and/or longitudinal research is needed to confirm our quantitative data.

Keywords: Relative age effect, referees, soccer, discrimination

Introduction

To ensure fair sports competition, young athletes are grouped into categories according to their chronological age. However, the current definition of age categories results in a relative age effect (RAE). This phenomenon refers ‘both to the immediate participation and long-term attainment constraints in sport, occurring as a result of chronological age and associated physical (e.g. height) differences as well as selection practices in annual age-grouped cohorts’ (Cobley, Baker, Wattie, & McKenna, 2009, p. 235). As a result, in one year completion bands, two children in the same category may differ in age by 12 months. The variation among teammates in terms of physical (e.g. Carling, Le Gall, Reilly, & Williams, 2009) and cognitive (e.g. Morrison, Smith, & Dow-Ehrensberger, 1995) development, especially during puberty (e.g. Delorme & Raspaud, 2009a), is thus likely to be considerable. In average, the relatively older players possess significant assets in terms of their size, weight and strength, which influence their ‘perceived potential’ (Carling et al., 2009; Helsen, Van Winckel & Williams, 2005). These adolescents are more easily identified as talented and are thus more apt to be selected for professional training or for national teams, which obviously gives them a better...
chance of reaching a high level of play or professional careers. This has been consistently illustrated by the unbalanced distribution of birthdates among elite players: players born at the beginning of the competitive year are typically over-represented, whereas those born at the end of the year are under-represented (e.g. Côté, Macdonald, Baker & Abernethy, 2006; Delorme, Boiché & Raspaud, 2009; Edgar & O’Donoghue, 2005; Musch & Hay, 1999; Pérez Jiménez & Pain, 2008). This unequal distribution has also been noted in young elite athletes (e.g. Barnsley & Thompson, 1988; Baxter-Jones, 1995; Helsen et al., 2005; Williams, 2010). Conversely, in activities such as dance and gymnastics, where physical attributes are not important, or even possibly disadvantageous, the RAE does not operate (e.g. Van Rossum, 2006).

However, RAE is observed not only in elite youth and adult athletes. Delorme and Raspaud (2009a) demonstrated this effect in the entire population of young players registered in the French Basketball Federation. A systematic RAE was also detected in the whole population of French female soccer players (Delorme, Boiché, & Raspaud, 2010b). This unbalanced distribution at the amateur level has two explanations. First, relatively younger children may be dissuaded from participating in sports that require certain physical attributes because they are developmentally at a disadvantage compared with relatively older children (Delorme, Boiché, & Raspaud, 2010a; Delorme, Chalabaev, & Raspaud, 2011). Second, those who participate anyway are more prone to dropout (Delorme, Boiché, & Raspaud, 2010a; Delorme et al., 2011; Helsen, Starkes, & Van Winckel, 1998).

### RAE and refereeing

A review of the sports sciences literature on RAE reveals that most research has focused on the players (Cobley et al., 2009; Musch & Grondin, 2001). To our knowledge, only the study by Cobley, Schorer, and Baker (2008) investigated RAE in other sports actors, namely coaches and referees. In their study of the Professional German Soccer League, these authors found a significant RAE in coaches but no effect in referees. They interpreted this finding as reflecting the tendency of many retired athletes to switch to coaching in their sport. In this case, the RAE in elite athletes is carried over into coaching, with coaches unknowingly contributing to the perpetuation of this effect. Concerning referees, the authors assumed that physical development and early maturity are not necessarily advantages. They also observed that refereeing following a high-level playing career is not a common practice in the soccer culture.

Although the study of Cobley et al. (2008) provided new insight into RAE in other sports actors, its scope was limited by an exclusive focus on professional sports. It is possible that the specificities of each refereeing level influence the presence/absence of RAE in soccer referees. For example, there are three refereeing levels in the French Federation of Soccer (Fédération Française de Football, FFF): district, regional and national. The age for eligibility differs across these levels, and only the district level includes referees younger than 18 years (see Table I). Given that RAE is strongest between 13 and 18 years (Musch & Grondin, 2001), a more detailed analysis of the refereeing levels is needed to probe for this effect.

### Refereeing as a ‘strategic adaptation’?

Previous research suggested that RAE has a psychological influence on children and their decision to engage in a particular sport. Relatively younger children seem to have lower self-esteem (Thompson, Barnsley, & Battle, 2004). Indeed, because of the disadvantages of being younger, it is assumed that these players experience more situations of failure and inferiority in their practice. For instance, Vaejens, Philippaerts, and Malina (2005) demonstrated that playing time of relatively older players in soccer games was greater than that of their younger counterparts. Because of these negative performance cues, it is likely that these young players feel less competent. Past studies conducted on dropout from team sports in fact revealed that reduced time of play (e.g. Guillet, Sarrazin, Carpenter, Trouilhou, & Cury, 2002) and low perceived competence (e.g. Ommundsen & Vagtun, 1991a, b) significantly accounted for decreased psychological commitment and higher dropout rates. In sum, relatively younger players who cannot perform as well as older players due to a less advanced stage of physical development, feel less competent, which eventually leads to a higher dropout rate, as shown in several studies (e.g. Delorme et al., 2010a; Delorme et al., 2011; Helsen et al., 1998). The worst scenario would be a definitive dropout from physical activities by relatively younger children, especially because of the multiple benefits of moderate but regular participation. Fortunately, these children can also decide to participate in sports in which physical attributes are less important (Delorme & Raspaud, 2009b; Larouche, Laurencelle,

<table>
<thead>
<tr>
<th>Level</th>
<th>Min. age</th>
<th>Max. age</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Regional</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>District</td>
<td>13</td>
<td>50</td>
</tr>
</tbody>
</table>
Grondin, & Trudeau, 2010). For instance, in a study examining RAE in shooting sports, Delorme and Raspaud (2009b) found an over-representation of relatively younger children in the 15–17 years category, which was only explained by the newcomers to this activity. This shift from one sport to another can be interpreted as a ‘strategic adaptation’ employed by these relatively younger children. The purpose of this study was thus to investigate whether refereeing could be another form of ‘strategic adaptation’. If a child chooses a specific sport but then does not feel competent enough to be a player, refereeing might be a way to stay involved while minimising threats to self-perceptions of competence.

**Hypotheses**

French refereeing has minimal age requirements that must be met and thus only the district level includes referees under 18 years old (see Table I). According to the FFF, referees are mostly recruited among the players. It is worth noting that relatively younger children (i.e. a player born late in competitive year) between 13 and 18 years old are systematically under-represented in the youth categories of the FFF (Delorme, Boiché, & Raspaud, 2010c) and over-represented in dropout (Delorme et al., 2010a). Given their relative age disadvantage, these youth are more frequently in situations of failure, and lower performance often means less playing time in competition (Vaeyens et al., 2005). As noted earlier, differences in physical development and playing time can undermine self-esteem and lead to early dropout (e.g. Ommundsen & Vaglum, 1991a, 1991b). In this context, refereeing may be an alternative (i.e. a strategic adaptation) that lets relatively younger players continue to participate in their chosen sport while preserving their self-esteem. Indeed, Carlsson (2006) found that refereeing has a positive impact on self-esteem and perceived ability. We thus expected that relatively younger players would tend to orient themselves more towards refereeing than their relatively older counterparts. In accordance with this hypothesis, we expected to observe a ‘reversed’ RAE in district referees under 18 years old, with an over-representation of relatively younger children.

An unbiased distribution in adult district referees can be assumed, as Baümler (1996) (quoted by Musch & Grondin, 2001) found a negative correlation between age and RAE. The author suggested that the physical advantages of relatively older players gradually decrease, and that this corresponds to a shift towards players with better technical attributes, even though they may have been disadvantaged in terms of relative age when they started. Indeed, physical differences do not persist after 17 years (Delorme & Raspaud, 2009a). Furthermore, Delorme et al. (2010a) found that French adult soccer players dropped out uniformly, whereas the relatively younger players in the U9–U18 categories were over-represented in withdrawals. In other words, the reduction/disappearance of physical differences over time (and their psychological consequences) should engender equal relative age-related recruitment of district referees from among adult soccer players. We thus expected no RAE in adult district referees.

We also did not expect any RAE in regional and national referees. Given the minimal age limits for these refereeing levels (see Table I) and for the aforementioned reasons, we assumed equal recruitment among adult soccer players. Previous results in high-level referees (Cobley et al., 2008) supported this hypothesis.

To sum up, the two following hypotheses were formulated: (1) ‘reversed’ RAE would be observed in district referees younger than 18 years old and (2) no RAE would be observed in district referees older than 18 years old, regional referees and national referees.

**Methodology**

**Data collection**

The dates of birth and the level of practice of all official male soccer referees (i.e. who have received their referee certificate) \((n = 13,952)\) who participated in the 2006–2007 FFF season were collected from the federation database. Female referees were excluded due to the small sample size, which precluded reliable statistics. We also removed referees without French citizenship to control the cut-off dates. We thus build a sample with 264 national referees \((M_{\text{age}} = 29.69, \ SD = 5.27, \min_{\text{age}} = 23, \max_{\text{age}} = 54)\), 2374 regional referees \((M_{\text{age}} = 31.11, \ SD = 8.81, \min_{\text{age}} = 19, \max_{\text{age}} = 58)\) and 11,314 district referees \((M_{\text{age}} = 26.86, \ SD = 11.19, \min_{\text{age}} = 13, \max_{\text{age}} = 60)\).

The dates of birth and level of practice of all official male referees \((n = 2272)\) who participated in the 2006–2007 FFF season but not the following season were also collected to analyse the distributions of dropouts. Female and foreign referees were removed from this sample for the same reasons. We thus build a sample with 83 national referees \((M_{\text{age}} = 32.34, \ SD = 6.94, \min_{\text{age}} = 24, \max_{\text{age}} = 60)\), 212 regional referees \((M_{\text{age}} = 30.26, \ SD = 8.87, \min_{\text{age}} = 19, \max_{\text{age}} = 59)\) and 1977 district referees \((M_{\text{age}} = 26.38, \ SD = 10.30, \min_{\text{age}} = 13, \max_{\text{age}} = 60)\).
Data analysis

We classified the referees’ dates of birth into four quarters for each refereeing level. Because referees are mostly players (or former players), they are subject to the same cut-off dates. Due to a change of the cut-off date in France (Jullien, Turpin, & Carling, 2008), referees who were born before 1982 were classified from Q1 (August–October) to Q4 (May–July). Those who were born in 1982 or after were classified from Q1 (January–March) to Q4 (October–December). Then, we conducted a chi-square goodness-of-fit test to determine whether the distribution differed from the theoretical expected distribution.

In studies investigating RAE, the theoretical distribution is usually calculated based on the birthdates in the entire population of the country concerned, for the corresponding years, using weighted mean scores. However, Delorme et al. (2010c) recently found that players’ registration data were the optimal source of reference data for the theoretical expected distribution. Therefore, the distributions considered in the present study will be those from the corresponding population of licensed players, using weighted mean scores. As aforementioned, another reason to choose this theoretical expected distribution for comparison is the fact that referees are mostly players (or former players). These data were obtained from the FFF.

Results

Table II shows the distributions by quarters and by refereeing levels of all male referees of the FFF during the 2006–2007 season. Table IV provides the same information concerning dropouts from refereeing during (or at the end of) the 2006/2007 season. Tables III and V, respectively, show the distributions by quarters of district referees in the 2006/2007 season and the distributions of those who gave up during this season. We distinguished referees under and above 18 years old in Tables III and V.

We observed that the distribution of all district referees was significantly unbalanced ($\chi^2 = 18.73$, $df = 3$, $P < 0.001$) with an over-representation of individuals who were born in Q4 ($\Delta = +178$) and an under-representation of those who were born in Q1 ($\Delta = -131$) and Q2 ($\Delta = -53$). As expected, this imbalance was exclusively located in referees of 18 years old and less ($\chi^2 = 8.03$, $df = 3$, $P < 0.05$), while the distribution was uniform for adults ($\chi^2 = 5.17$, $df = 3$, $P < 0.16$). Concerning regional referees ($\chi^2 = 2.09$, $df = 3$, $P < 0.554$) and national referees ($\chi^2 = 3.75$, $df = 3$, $P < 0.290$), the results also provide support for our initial hypothesis as uniform distributions were found for both groups.

Concerning dropout, we observed that referees gave up this function uniformly at all levels (i.e. district referees: $\chi^2 = 5.38$, $df = 3$, $P < 0.146$; regional referees: $\chi^2 = 3.47$, $df = 3$, $P < 0.325$; national referees: $\chi^2 = 3.44$, $df = 3$, $P < 0.328$). No differences were found in district referees related to age. Dropout of district referees both under and above 18 years was uniformly distributed ($\chi^2 = 2.02$, $df = 3$, $P < 0.57$ and $\chi^2 = 2.17$, $df = 3$, $P < 0.54$, respectively).

Discussion

The aim of this study was to investigate whether refereeing can be a ‘strategic adaptation’ for relatively younger children. The results provide support for our initial hypotheses. As expected, the group of under-18 district referees showed ‘reversed’ RAE, with an over-representation of individuals born in Q3 and Q4 and an under-representation of those born in Q1 and Q2. This skewed distribution was the result of a higher number of new referees born in Q3 and Q4, as under-18 district referees dropped out uniformly from this activity (see Table V). These findings provide some support to the assumption that relatively younger children orient themselves more towards refereeing in soccer than their relatively older counterparts. In other words, these children may display a shift in investment from soccer playing to soccer refereeing. By doing so, they offer themselves an alternative that allows them to continue their involvement in soccer and to progress in another domain without threats to their self-perception, as refereeing has a positive impact on self-esteem and perceived ability (Carlsson, 2006).

Table II. Distribution of French male soccer referees (2006–2007)

<table>
<thead>
<tr>
<th>Level</th>
<th>Q1 (%)</th>
<th>Q2 (%)</th>
<th>Q3 (%)</th>
<th>Q4 (%)</th>
<th>Total</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>80 (30.30)</td>
<td>57 (21.60)</td>
<td>64 (24.24)</td>
<td>63 (23.86)</td>
<td>264</td>
<td>3.75</td>
<td>&lt;0.29</td>
</tr>
<tr>
<td>((\Delta))</td>
<td>(+12)</td>
<td>(-9)</td>
<td>(-1)</td>
<td>(-2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>635 (26.75)</td>
<td>577 (24.30)</td>
<td>578 (24.35)</td>
<td>584 (24.60)</td>
<td>2374</td>
<td>2.09</td>
<td>&lt;0.55</td>
</tr>
<tr>
<td>((\Delta))</td>
<td>(+27)</td>
<td>(-21)</td>
<td>(-5)</td>
<td>(-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District</td>
<td>2807 (24.81)</td>
<td>2859 (25.27)</td>
<td>2814 (24.87)</td>
<td>2834 (25.05)</td>
<td>11,314</td>
<td>18.73</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>((\Delta))</td>
<td>(-131)</td>
<td>(-53)</td>
<td>(+6)</td>
<td>(+178)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: \(\Delta\) is the difference between observed distribution and theoretical expected distribution.
It was interesting to note that the distributions of adult district, regional and national referees were unbiased. Given that the physical differences related to RAE do not persist into adulthood, however, this was logical to expect an equal involvement at this age. Although the ‘reversed’ RAE noted in the young referees could have affected the distribution of these categories, the effect would certainly be negligible as the size of RAE is shown to be attenuated over time with a reduction in differences due to growth (e.g. Baumler, 1996). This finding reinforces the assumption that RAE may lead to strategic adaptations particularly in relatively younger children. In sum, either young children choose a new role to maintain their involvement with their favourite sport or they dropout and choose other activities in which the physical dimension is less salient (Delorme & Raspaul, 2009b; Larouche et al., 2010). Nevertheless, this interpretation should be supported by qualitative data on the reasons for becoming involved in refereeing.

RAEs point to social inequality. Some authors even qualify these effects as discriminatory (e.g. Edgar & O’Donoghue, 2005; Hurley, Lior & Tracze, 2001; Musch & Hay, 1999). For these authors, even if the discrimination is inadvertent, it needs to be cautiously examined, given the lucrative nature of certain sports. Others argue that sports are health-enhancing and should enable every child to blossom (Musch & Grondin, 2001). The selection system thus works against societal goals such as inclusion, availability, the right for every individual to develop his/her unique capacities within sports, and policies to promote physical activity for all children and youth. Indeed, the system seems detrimental for certain children’s motivation, leading them to dropout and perhaps curtailing the physical activity habits they ideally would carry into adulthood. Fortunately, recent findings suggest that RAE does not influence physical activity level in adults (Larouche et al., 2010). More pragmatically, some authors note that RAE, as an artificial consequence of the youth competition structure, generates a loss in potentially talented players, which in the long run contributes to a decrease in the level of professional and national teams (e.g. Pérez Jiménez & Pain, 2008).

Given these potential economic, psychological and health-related outcomes of RAE, the majority of authors agree that this phenomenon needs to be reduced or eliminated. New categorisation systems have thus been proposed for young sports participants, based on either biological or chronological age, to deal with the negative correlates of relative age differences (Cobley et al., 2009; Musch & Grondin, 2001). From this point of view, the shift from playing to refereeing in relatively younger children can be seen as a kind of social determinism (i.e. a systemic discrimination) that works against the policies promoting physical activity and, most importantly, against the right of every individual to develop his/her unique capacities within sports.

Coaches need to be made more aware of this phenomenon. They have a central role in the sports system and are ideally positioned to help children and adolescents to understand that their physical deficits are only temporary, that the gap will ultimately be filled with time/growth, and that more controllable factors are also important to succeed in sports. However, coaches seem to be the best candidates for actively countering RAE. Their effi-

<table>
<thead>
<tr>
<th>Level</th>
<th>Q1 (%)</th>
<th>Q2 (%)</th>
<th>Q3 (%)</th>
<th>Q4 (%)</th>
<th>Total</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>1978 (24.57%)</td>
<td>2045 (25.40%)</td>
<td>1987 (24.68%)</td>
<td>2042 (25.35%)</td>
<td>8052</td>
<td>5.17</td>
<td>&lt;0.16</td>
</tr>
<tr>
<td>(Δ)</td>
<td>(−82)</td>
<td>(+15)</td>
<td>(+8)</td>
<td>(+59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 and less</td>
<td>829 (25.41%)</td>
<td>814 (24.95%)</td>
<td>827 (25.35%)</td>
<td>792 (24.29%)</td>
<td>3262</td>
<td>8.03</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>(Δ)</td>
<td>(−35)</td>
<td>(−34)</td>
<td>(+8)</td>
<td>(+61)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Δ is the difference between observed distribution and theoretical expected distribution.

Table IV. Distribution of French male soccer referee dropouts (2006–2007)

<table>
<thead>
<tr>
<th>Level</th>
<th>Q1 (%)</th>
<th>Q2 (%)</th>
<th>Q3 (%)</th>
<th>Q4 (%)</th>
<th>Total</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>27 (32.53%)</td>
<td>14 (16.87%)</td>
<td>26 (31.32%)</td>
<td>16 (19.28%)</td>
<td>83</td>
<td>3.44</td>
<td>&lt;0.33</td>
</tr>
<tr>
<td>(Δ)</td>
<td>(+2)</td>
<td>(−4)</td>
<td>(+6)</td>
<td>(−4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>51 (24.06%)</td>
<td>57 (26.89%)</td>
<td>44 (20.75%)</td>
<td>60 (28.30%)</td>
<td>212</td>
<td>3.47</td>
<td>&lt;0.32</td>
</tr>
<tr>
<td>(Δ)</td>
<td>(−6)</td>
<td>(+5)</td>
<td>(−8)</td>
<td>(+9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District</td>
<td>504 (25.49%)</td>
<td>526 (26.61%)</td>
<td>494 (24.99%)</td>
<td>453 (22.91%)</td>
<td>1977</td>
<td>5.38</td>
<td>&lt;0.15</td>
</tr>
<tr>
<td>(Δ)</td>
<td>(+14)</td>
<td>(+26)</td>
<td>(+2)</td>
<td>(−42)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Δ is the difference between observed distribution and theoretical expected distribution.
cacy might also depend on their organisation’s policies and the way their discourse is heard and supported by the parents of players.

Conclusion

This study brings to light new elements in the potential relationship between relative age and refereeing. Qualitative and/or longitudinal research is now needed to confirm our quantitative data. Our findings, as well as those of Cobley et al. (2008), nevertheless, invite researchers interested in RAE to give closer attention to other sports actors (e.g. referees, coaches, sports leaders) to determine whether relative age affects the choice to develop in these other roles. Indeed, although the present results and previous research (Delorme & Raspaud, 2009b; Larouche et al., 2010) seem to indicate a shift towards less selective sports/roles by relatively younger children, these ‘strategic adaptations’ need to be examined more specifically in future research designs. They may be seen as a kind of social determinism discriminating against relatively younger children. It would also be interesting to carry out the same analysis using data on female referees in order to see if the same pattern is replicated. These new perspectives may provide a contribution to greater understanding of RAEs.

References


